

- (21) Application No. 48958/74 (22) Filed 12 Nov. 1974  
 (31) Convention Application No. 414 765 (32) Filed 12 Nov. 1973 in  
 (33) United States of America (US)  
 (44) Complete Specification published 1 Sept. 1977  
 (51) INT. CL.<sup>3</sup> B65D 11/20 21/02 43/10  
 (52) Index at acceptance  
 B8P 16 21B 8J 9B2 X7



(54) IMPROVEMENTS IN OR RELATING TO SHIPPING  
CONTAINERS

(71) We, GEORGE ANTHONY LUCAS, SR., of 1325 Rounds Street, Delano, GEORGE ANTHONY LUCAS JR., of Route 2, Box 739, Delano, both in the State of California 5 93215, and LOUIS ANTHONY LUCAS, of 4826 Huntington Way, Santa Maria, State of California 93454, all in the United States of America, all citizens of the United States of America, do hereby declare the invention, 10 for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

15 This invention relates to shipping containers and particularly to shipping containers for grapes and other types of agricultural produce. In the past, boxes of various types such as wooden boxes have 20 been utilized for the shipping of grapes and other agricultural products. Such boxes have numerous disadvantages in addition to being relatively high in cost. There is, therefore, a need for a new and improved 25 shipping container.

According to one aspect of the present invention there is provided a shipping container of the type which can be stacked comprising a bottom part and a top part 30 formed of a plastics foam material, said bottom part having a bottom wall, spaced generally parallel side walls and spaced generally parallel end walls, said side walls of said bottom part having vertical outer 35 surfaces with tapered surfaces extending inwardly adjacent the lower portions thereof, said side walls of said bottom part having openings extending through the tapered surfaces of the side walls of the bottom 40 part, said tapered surfaces on the side walls of the bottom part having a height so that the openings in the bottom part extend solely through the tapered surfaces of the side walls of the bottom part, said top part 45 having a top having a top wall, spaced

generally parallel side walls and spaced generally parallel end walls, said side walls of said top part having vertical outer surfaces with tapered surfaces extending inwardly adjacent the upper portions thereof, 50 said side walls of said top part having openings extending through the tapered surfaces of the side walls of the top part, said tapered surfaces on the side walls of the top part having a height so that the open- 55 ings in the top part extend solely through the tapered surfaces of the side walls of the top part, cooperative mating means carried by the bottom and top parts whereby the top part is releasably secured to the 60 bottom part to form an enclosed volume within the bottom and top parts which is ventilated by the openings in bottom and top parts, cooperative stacking means carried by the bottom and top parts adapted to 65 mate with containers of the same type so that the containers may be stacked with the top part of one container engaging the bottom part of another container and inhibiting substantial lateral and longitudinal 70 movement of the containers with respect to each other so that the containers are interlocked when stacked one on top of the other or when they are cross stacked, said cooperative stacking means including a 75 plurality of spaced parallel rows of recesses in the outer surface of one of the parts, and protrusions formed on the outer surface of the other of the parts and having a shape so that they are adapted to fit within 80 said recesses.

The cooperative mating means may be in the form of an outwardly facing recess extending around said one part near the outer margin thereof and an inwardly fac- 85 ing recess extending around the outer extremity of the top part so that said top and bottom parts can be fitted together with the outer surfaces of the end and side walls being substantially flush. Preferably the 90

cooperative mating means includes a pair of spaced protrusions carried on opposite walls of one of the parts and spaced holes carried by corresponding walls of the other part and adapted to be engaged by said protrusions.

The outer upper surface of the top part may be provided with a plurality of spaced channels into which the openings in the top part extend.

According to another aspect of the present invention there is provided a stack comprising a plurality of shipping containers in accordance with the present invention as defined above, wherein the containers each have a length substantially greater than the width and are stacked in layers with the containers in one layer being disposed end to end in one direction and side by side in another direction with the containers in the row above being stacked crosswise of the containers below so that for each two containers stacked end to end in the row below, there are three containers positioned side by side in the layer above to provide a stack which is substantially square in cross-section with generally flush outer sides, said cooperative stacking means of the containers inhibiting substantial lateral and longitudinal movement of the containers with respect to each other.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a side elevational view of the shipping container according to the present invention,

Figure 2 is a top plan view of the shipping container shown in Figure 1 looking along the line 2-2 of Figure 1,

Figure 3 is an end elevation view of the shipping container shown in Figure 1 looking along the line 3-3 of Figure 1,

Figure 4 is a bottom plan view of the shipping container shown in Figure 1 looking along the line 4-4 of Figure 1,

Figure 5 is a view showing the manner in which shipping containers can be stacked on the pallet and showing the interlocking arrangement between the containers,

Figure 6 is a cross-sectional view taken along the line 6-6 of Figure 2.

Figure 7 is a cross-sectional view taken along the line 7-7 of Figure 2.

The shipping container 11 shown in the drawing consists of a bottom part 12 and a top part or lid 13. The bottom and top parts 12 and 13 are unitary and are formed of a plastics foam material, for example a styrofoam marketed under the trademark "XSM-1" and polystyrene. When made from such material, the bottom and top parts 12 and 13 can be readily formed

in molds. The containers can have any desired color. However, white has been found to be preferable for reasons hereinafter set forth.

The bottom part 12 consists of a bottom wall 16 which lies in a plane and has a generally planar outer surface 17 as shown in Figure 1 and an inner surface 18 which is generally curved upwardly in its outer extremities as also shown in Figure 1. The bottom part also consists of spaced generally parallel and generally vertical side walls 19 and 21 which adjoin the bottom wall and a pair of spaced generally parallel and vertical end walls 22 and 23 which also adjoin the bottom wall and the side walls 19 and 21 and extend generally at right angles to the side walls 19 and 21. The side walls 19 and 21 are provided with inner surfaces (see Figure 6) and outer surfaces 27 which are generally vertical. The lower extremities of the side walls 19 and 21 are inclined inwardly, as can be seen particularly in Figure 6, so that the bottom part of the container is provided with an inwardly tapered portion which extends the length of the bottom part on both sides of the bottom part for a purpose hereinafter described. The end walls 22 and 23 are provided with generally vertical inner surfaces 28 and generally vertical outer surfaces 29 (see Figure 7).

The top part or lid 13 consists of a top wall 31 which generally lies in a plane and is provided with an outer generally planar surface 32 and an inner generally planar surface 33. A pair of spaced generally parallel, vertically depending side walls 34 and 36 adjoin the top wall 31 and are formed integral therewith. The side walls 34 and 36 are provided with generally vertical inner surfaces 37 and outer surfaces 38. The top part or cover 13 also consists of spaced generally parallel depending end walls 41 and 42 which adjoin the top wall 31 and extend at right angles to the side walls. The end walls 41 and 42 are provided with generally planar vertical inner surfaces 43 and outer surfaces 44. The outer surface 38 of the side walls 34 and 36 is provided with an upwardly and inwardly inclined surface portion 38a.

Four holes 51 arranged on the corners of a square are centrally disposed within the bottom wall 16 and extend through the bottom wall 16 as shown in Figure 4. A plurality of holes 52 are provided in the top wall 31 and extend therethrough. The holes 52 are spaced apart and are provided in two parallel rows extending longitudinally of the top wall 31.

Cooperative mating means is carried by the bottom and top parts 12 and 13 whereby the top part is releasably secured to the bottom part to form an enclosed volume

within the bottom and top parts. This cooperative mating means includes an outwardly facing recess 57 formed on the upper portion of the bottom part. Similarly, an inwardly and downwardly facing recess 58 is formed in the lower extremity of the top part 13. The recesses 57 and 58 are sized in such a manner so that they recess into each other so that smooth inner surfaces are provided for the enclosed volume 56 and smooth outer surfaces are provided for the container.

Means is provided for releasably locking the top part 13 to the bottom part 12 and consists of a pair of spaced protrusions 61 which are formed integral with the end walls 22 and 23 of the bottom part 12 and extend into the recess 57. The protrusions 61 are in the form of semi-circular portions as shown in Figure 3. The protrusions 61 are adapted to seat in semi-circular recesses 62 which are formed in the end walls 41 and 42 of the top part 13. As can be seen, the recesses 62 are semi-circular at their lower extremity but are elongate and extend to the top of the top part 13 so that the recesses in effect are elongate with semi-circular bottom portions. The recesses 62 are formed in such a manner so that there are provided semi-circular openings 63 which open through the lower portion of the top part 13 and into the recess 58 so that they can receive the spaced protrusions 61. Thus, it can be seen that the top part can be moved downwardly over the protrusions 61 so that the protrusions snap into place into the semi-circular holes 63 to lock the top part or cover 13 firmly in place.

In the event it is desired to remove the cover, the upper portion of one of the end walls 22 is pressed inwardly as by hand to thereby permit the protrusion 61 to clear the lower extremities of the top part 13 so that the cover can be removed. It should be appreciated that the protrusions 61 can be formed on the top part and the semi-circular holes 63 formed in the other part if desired.

Cooperative stacking means is carried by the bottom and top parts and is adapted to mate with containers of the same type so that the containers may be stacked with the top part of one container engaging the bottom part of another container for inhibiting substantial lateral and longitudinal movement of the containers with respect to each other.

The cooperative stacking means includes a plurality of spaced parallel rows of recesses 66 extending in one direction in the outer surface of one of the parts, namely the top part 13 as shown in the drawing. For example, as shown in Figure 2, six rows of the recesses are provided in which the recesses are equally spaced on the top

wall. The recesses 66 are provided with enlarged portions 66a which are generally square in shape and which are spaced longitudinally of the recesses 66. Thus, as shown in the drawings, two of the enlarged portions are provided at the outer extremities of the recesses 66, whereas the other two enlarged portions are intermediate the ends of the recesses. It will be noted that the two rows of holes 52 are centrally disposed in the two enlarged portions 66a of the recesses 66. In addition, there are provided pairs of cross recesses 67 which extend between the inner enlarged portions of the two outermost recesses 66 on opposite ends of the top part 13.

The cooperative stacking means includes raised portions provided on the outer surface of the bottom wall of the bottom part 12. The raised portions or protrusions 68 are generally right-angle in shape as shown in Figure 4. As shown therein, the right-angle protrusions 68 are provided with arcuate outer surfaces 69 and arcuate inner surfaces 71. The protrusions 68 are shaped in such a way and have such a size so that they can readily fit into the enlarged portions 66a of recesses 66. The protrusions 68 are provided adjacent the four corners of the outer surface of the bottom wall 16 (see Figure 4). This facilitates stacking of the containers as hereinafter described.

The containers, as hereinbefore described, are formed in such a manner so that they can readily be stacked one upon the other as, for example, upon a wood pallet 81 as shown in Figure 5. The wood pallet 81 is of a conventional construction and is provided with a top surface 82 upon which the containers 11 can be stacked. The containers 11 can be of a suitable size such as approximately 20 inches in length and 13 inches in width, or a length approximately one and one-half times the width. The bottom part 12 has a height of approximately 6 inches and the top part 13 has a height of slightly in excess of 2½ inches. With shipping containers 11 having such dimensions, six containers may be placed in each layer of containers carried by the pallet. Thus, as shown in Figure 5, three rows of two containers each arranged end to end are positioned on the first layer. In the second layer from the bottom of the pallet, the containers 11 are arranged at an angle of 90° with respect to the containers therebelow. In this layer there are provided three rows of two containers in each row being arranged end to end and the containers in the rows being arranged side by side in parallel rows. Similarly, in the third layer from the bottom, the containers are arranged in the same manner as they are on the bottom layer. In the fourth layer they are arranged in the same manner

as the second layer, and so on until a total of nine layers is provided on the pallet. A plurality of cardboard reinforcing members 84 which are L-shaped in cross-section are provided on opposite sides of the stack 86 of shipping containers 11 provided on the pallet 81. A pair of steel straps 87 are passed over the top of the stack and through the pallet as shown in Figure 5 to secure the stack to the pallet. An additional steel strap 88 extends around the stack approximately two-thirds of the height of the stack and engages cardboard reinforcing members 89 placed on the four corners of the stack. With such an arrangement, it can be seen that with six of the containers in each of the layers and nine layers, that 54 containers can be provided on each pallet. Since the containers are very strong, it is possible to provide palletized stacks which can be stacked one on top of the other as, for example, as many as three high without danger of crushing the shipping containers.

It should be particularly noted that when the containers are stacked together in the manner shown, the containers in the row above are cross stacked with respect to the containers below, and vice versa, with the protrusions 68 on the bottom part 13 seat with the enlarged portion 66a of the recesses 66 of the container therebelow. The protrusion on one corner of the bottom part 12 will fit into the enlarged portion 66a of one corner of the top part 13 of the container therebelow. The other protrusion 61 of the container above will fit into the enlarged portion 66a of the fourth recess counting from the left of the top part 13 of the container therebelow. The protrusions 68 are generally in the form of a right angle and, therefore, are adapted to fit within the square enlarged portion 66a. The next container to the right as viewed in Figure 5 has the protrusion 61 of its bottom part 12 seated in the enlarged portion 66a of the second recess 66 from the right as viewed in Figure 5 of the container therebelow. The other protrusion on the bottom part 12 of the container above fits into the second recess from the left of the next container in the row below. The third container in the second row from the bottom has its protrusions 61 fitting into the fourth and first recesses 66 counting from the right as viewed in Figure 5.

The same interlocking arrangement is carried out with the remainder of the containers in the first and second levels of the stack. Thus, there are provided three rows of two containers which are arranged end to end in the first stack and three rows of containers arranged end to end extending in the transverse direction or crosswise direction. The other ends of the containers extending in the transverse direction have

their protrusions 61 extending into the second enlarged portions 66a and the recesses counting from the forward edge of the container to the rear of the container as shown in Figure 5 in the first level of containers. In effect, it can be appreciated that the arrangement would be identical to that which is shown with respect to the second and third level of containers. Thus, the manner in which the containers interlock with each other as viewed from the right-hand side of Figure 5 can readily be imagined merely by going down one layer or going up one layer from the arrangement shown in Figure 5.

In this way, it can be readily seen that a compact four-sided stack of containers can easily be provided which can be banded together on a pallet as shown in Figure 5 with the stack being generally square in cross-section and having four relatively flush surfaces. The stack is very stable and compact.

In addition, even though a relatively compact stack is provided which has great stability because of the cross stacking of every other row of the containers, adequate air channels are provided between the containers so that in effect every container is like an outside container. This is accomplished because of the tapered side walls provided on the bottom and top parts which form air channels 91 and 92 between the bottom part 12 and the top part 13, respectively, as shown in Figure 5, between adjacent containers on the same level which are stacked side by side as, for example, the second, fourth, sixth and eighth layers of containers looking from the side shown in Figure 5 and the first, third, fifth, seventh and ninth rows looking from either the left or right-hand side of the stack as shown in Figure 5. These air channels 91 and 92 extend completely through the stack so that there is ready access for air to all side walls of all of the containers in the stack.

The air channels 91 are in communication with a plurality of spaced slots 96 in each container 11 which open through the bottom wall 16 and outwardly through the tapered outer surface 27a of the side wall 19 into the air channel and into the enclosed volume 56 within the container 11. There are provided two parallel rows of spaced slots on opposite sides of the bottom part of each of the shipping containers. Similarly, there are provided a plurality of spaced slots 97 on opposite sides of the cover or top part 13. These slots 97 open through the top wall 31 and its outer surface 38 and the tapered surface 38a of the side walls 34 and 36 of the top part 13. These slots 97 open into the air channels 92. It also should be noted, as shown in Figure 2, that the slots 97 open into the recesses 66 so that air can

pass to the recesses 66 and into the holes 52. In this manner it can be seen there is ready and adequate air circulation between the interior of the containers and the air channels 91 and 92 on opposite sides of the containers.

The use of the containers may now be briefly described as follows. Let it be assumed that it is desired to utilize the containers for the packing and shipping of grapes. When such is the case, the containers are taken to the field and are given to the pickers where they are filled with grapes by the pickers. It has been found that the containers are very satisfactory to the pickers because they are very light in weight. In addition, the pickers do not get splinters from them as is the case with wooden boxes which have been utilized in the past. Since the containers are white, they have a lesser tendency to absorb heat and, therefore, will stay cooler in the field than wooden boxes. Since the grapes before they are picked are normally in the shade of the leaves of the grape vine, the grapes when placed in the containers will be kept cooler and, therefore, there will be less damage to the grapes.

As soon as the bottom part 12 of the shipping container has been filled with grapes by the picker, a cover or top part 13 is placed over the grapes and over the bottom part so that the outer end wall 41 are cammed outwardly over the spaced protrusions 61 formed on the bottom part until the protrusions 61 snap into engagement with the semi-circular holes 63 provided in the top part 13. Thus, it can be seen that the container can be readily closed with very little effort and without the use of nails which are normally required with wooden boxes. Since the boxes are white, the grapes will have a tendency to stay cooler. The construction of the cover or the top part of the container 13 is such that there is very little, if any, "cover damage" to the grapes in the container when the top part or cover is put in place.

As soon as the containers have been filled, they can be palletized in the field in the manner shown in Figure 5, or they can be taken to a packing shed where they can be palletized. The pallets with the containers thereon are then rapidly moved into refrigerated areas of the warehouses where they are pre-cooled for a period ranging from 24 hrs. to 36 hrs. to bring the temperature of the grapes down to approximately 34°F. During this same time, a preservative gas is introduced into the containers to prevent decay of the grapes.

Because of the air channels 91 and 92 which are provided between the containers after they have been palletized, cooling air can be readily introduced into all of the

containers through the slots 96 and 97. Thus, it is possible to readily cool the grapes in the containers even though the containers have been palletized.

After the grapes have been pre-cooled, they can be placed in holding rooms at 32°F. The containers can remain palletized so that they can be readily shipped from one location to another. The air channels 91 and 92 provide adequate ventilation at all times for the grapes in the containers.

From the foregoing, it can be seen that uniform stacks of containers can be provided on shipping pallets. Such containers have a lesser weight than wooden boxes and also have a lower cost. They also can be readily closed as hereinbefore described. To open the same, it is merely necessary to press inwardly on the upper extremity of the ends of the bottom part 12 as shown in Figure 7 so that the protrusions 61 carried by the end walls of the bottom part will clear the semi-circular holes 63 provided in the end walls of the top part 13 whereby the top part can be lifted upwardly to open the container. After the grapes have been removed from the container, the container can be disposed of. It is relatively easy to dispose of because it can be ground up and then disposed of, or alternatively, it can be burned with very little residue.

It has been found that the containers are also advantageous over wooden boxes in that the containers do not absorb moisture from the grapes which the wooden boxes have a tendency to do.

Because of the cross stacking which is permitted by the construction of the containers, the containers are more easily and less expensively palletized; for example, less banding is required than is the case with wooden boxes. As can be seen from the drawing, only two vertically extending bands are required and one horizontally extending band. The containers also can be readily stacked without any danger of crushing the fruit within the containers.

It has been found that the containers are also advantageous in that the grapes do not have a tendency to sweat until the top part or cover is removed. This is probably due to the fact that the container is formed of a material which is a relatively good insulator. This insulating quality is advantageous in the field because in combination with the white color, the interior of the container will remain cooler.

It will be apparent from the foregoing that there has been provided a container which is particularly adaptable for the shipping of fruit, and vegetables. It is relatively light in weight, inexpensive and can be readily used in the field. In addition, it can be readily palletized and is particularly useful for pre-cooling of the fruit or

vegetables in the container and for introducing preservative gas into the fruit or vegetables.

**WHAT WE CLAIM IS:**

5 1. A shipping container of the type which  
can be stacked comprising a bottom part  
and a top part formed of a plastics foam  
material, said bottom part having a bottom  
wall, spaced generally parallel side walls  
10 and spaced generally parallel end walls,  
said side walls of said bottom part having  
vertical outer surfaces with tapered surfaces  
extending inwardly adjacent the lower por-  
tions thereof, said side walls of said bottom  
15 part having openings extending through  
the tapered surfaces of the side walls of the  
bottom part, said tapered surfaces on the  
side walls of the bottom part having a height  
so that the openings in the bottom part ex-  
20 tend solely through the tapered surfaces of  
the side walls of the bottom part, said top  
part having a top having a top wall, spaced  
generally parallel side walls and spaced  
generally parallel end walls, said side walls  
25 of said top part having vertical outer sur-  
faces with tapered surfaces extending in-  
wardly adjacent the upper portions thereof,  
said side walls of said top part having open-  
ings extending through the tapered surfaces  
30 of the side walls of the top part, said  
tapered surfaces on the side walls of the  
top part having a height so that the open-  
ings in the top part extend solely through  
the tapered surfaces of the side walls of  
35 the top part, cooperative mating means car-  
ried by the bottom and top parts whereby  
the top part is releasably secured to the  
bottom part to form an enclosed volume  
within the bottom and top parts which is  
40 ventilated by the openings in bottom and  
top parts, cooperative stacking means car-  
ried by the bottom and top parts adapted  
to mate with containers of the same type  
so that the containers may be stacked with  
45 the top part of one container engaging the  
bottom part of another container and in-  
hibiting substantial lateral and longitudinal  
movement of the containers with respect to  
each other so that the containers are inter-  
50 locked when stacked one on top of the  
other or when they are cross stacked, said  
cooperative stacking means including a  
plurality of spaced parallel rows of recesses  
in the outer surface of one of the parts, and  
55 protrusions formed on the outer surface of

the other of the parts and having a shape  
so that they are adapted to fit within said  
recesses.

2. A shipping container as claimed in  
claim 1 wherein said cooperative mating 60  
means is in the form of an outwardly facing  
recess extending around said one part near  
the outer margin thereof and an inwardly  
facing recess extending around the outer  
extremity of the top part so that said top 65  
and bottom parts can be fitted together  
with the outer surfaces of the end and  
side walls being substantially flush.

3. A shipping container as claimed in  
claim 2 wherein said cooperative mating 70  
means includes a pair of spaced pro-  
trusions carried on opposite walls of one  
of the parts and spaced holes carried by  
corresponding walls of the other part and  
adapted to be engaged by said protrusions. 75

4. A shipping container as claimed in  
any one of claims 1 to 3 wherein the outer  
upper surface of the top part is provided  
with a plurality of spaced channels into  
which the openings in the top part extend. 80

5. A stack comprising a plurality of  
shipping containers as claimed in any one  
of the preceding claims, wherein the  
containers each have a length substantially  
greater than the width and are stacked in 85  
layers with the containers in one layer  
being disposed end to end in one direction  
and side by side in another direction with  
the containers in the row above being  
stacked crosswise of the containers below 90  
so that for each two containers stacked  
end to end in the row below, there are  
three containers positioned side by side in  
the layer above to provide a stack which  
is substantially square in cross-section with 95  
generally flush outer sides, said cooperative  
stacking means of the containers inhibiting  
substantial lateral and longitudinal move-  
ment of the containers with respect to each  
other. 100

6. A shipping container substantially as  
hereinbefore described with reference to  
and as illustrated in the accompanying  
drawings.

GEORGE ANTHONY LUCAS, Sr.,  
GEORGE ANTHONY LUCAS Jr.,  
LOUIS ANTHONY LUCAS  
per: BOULT, WADE & TENNANT,  
34 Cursitor Street, London EC4A 1PQ  
Chartered Patent Agents

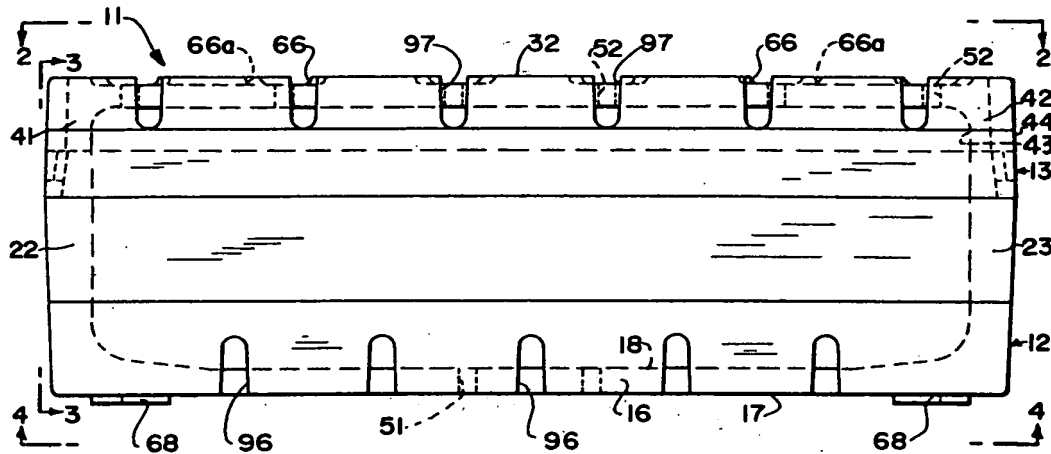


FIG.-1

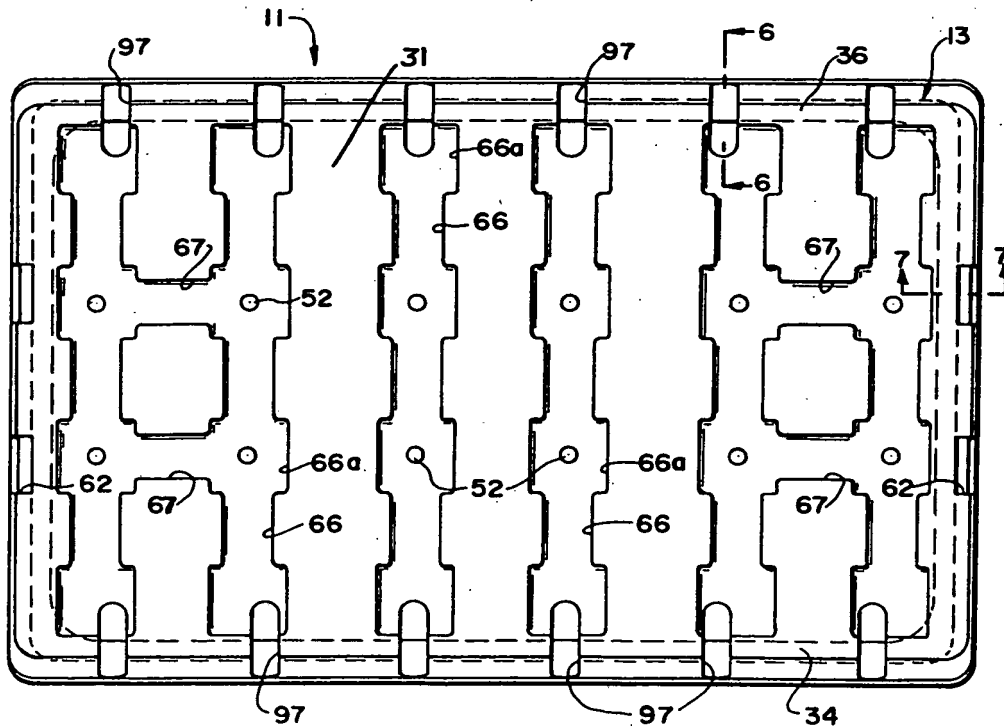
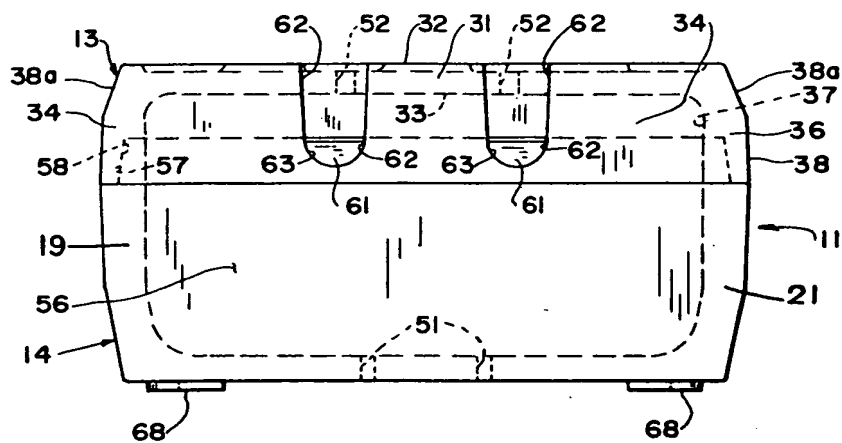


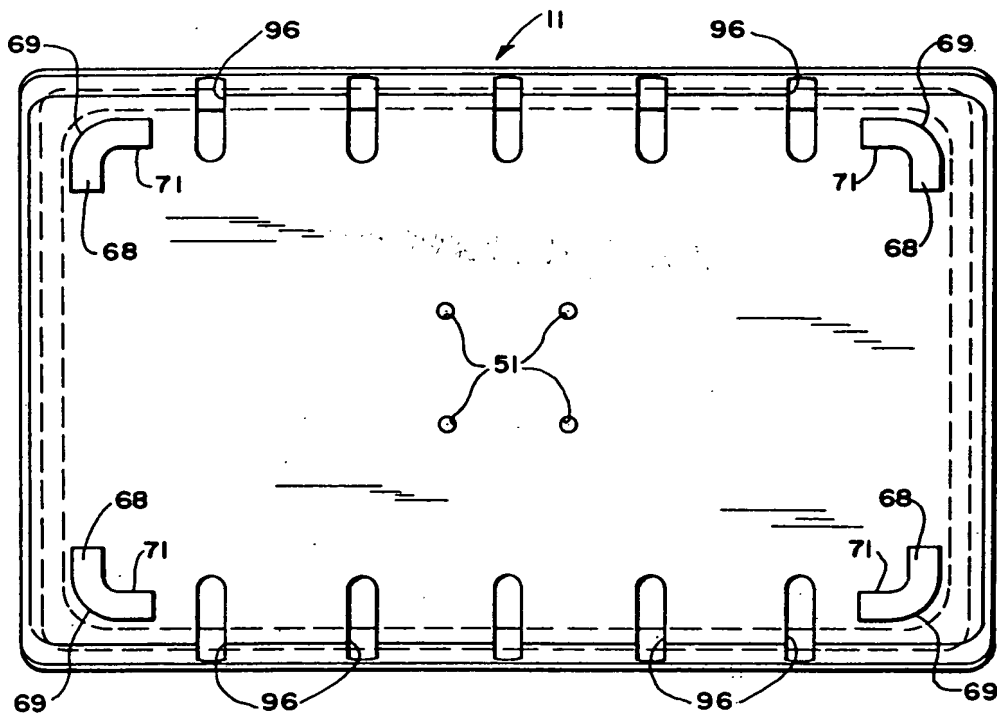
FIG.-2

**THIS PAGE BLANK (USPTO)**





**FIG.-3**



**FIG.-4**

**THIS PAGE BLANK (USPTO)**

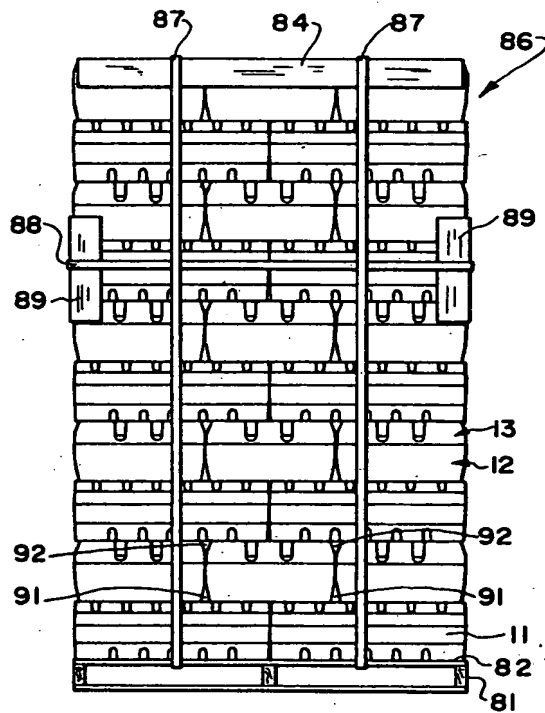


FIG.-5

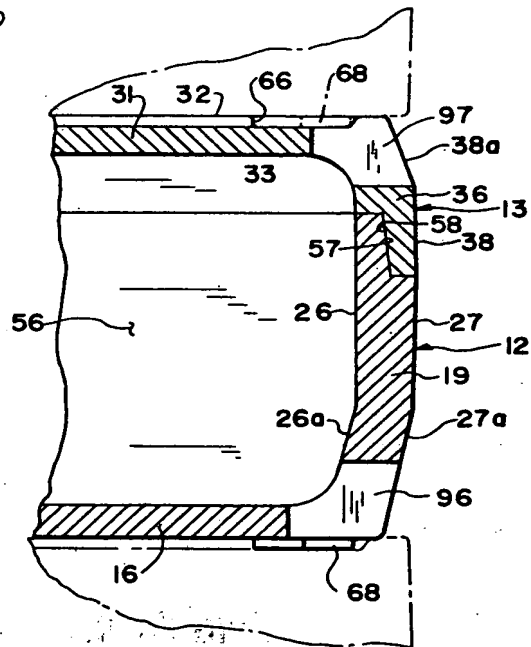


FIG.-6

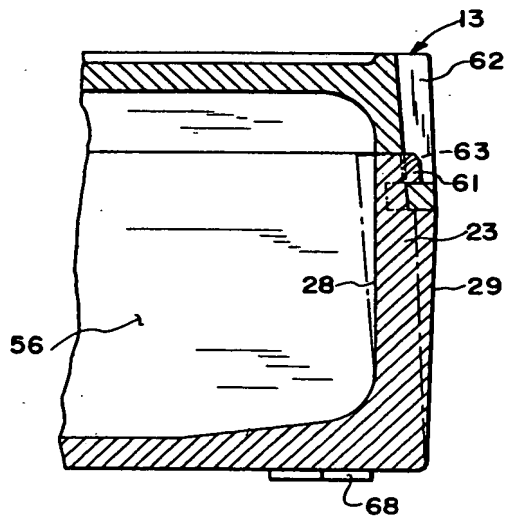


FIG.-7

**THIS PAGE BLANK (USPTO)**